

PSYCHOLOGY

(8th Edition)

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PowerPoint Slides

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Learning

Chapter 8

Learning

How Do We Learn?

Classical Conditioning

- Pavlov's Experiments
- Extending Pavlov's Understanding
- Pavlov's Legacy

Learning

Operant Conditioning

- Skinner's Experiments
- Extending Skinner's Understanding
- Skinner's Legacy
- Contrasting Classical & Operant Conditioning

Learning

Learning by Observation

- Bandura's Experiments
- Applications of Observational Learning

Definition

Learning is a relatively permanent change in an organism's behavior due to experience.

Learning is more flexible in comparison to the genetically-programmed behaviors of Chinooks, for example.

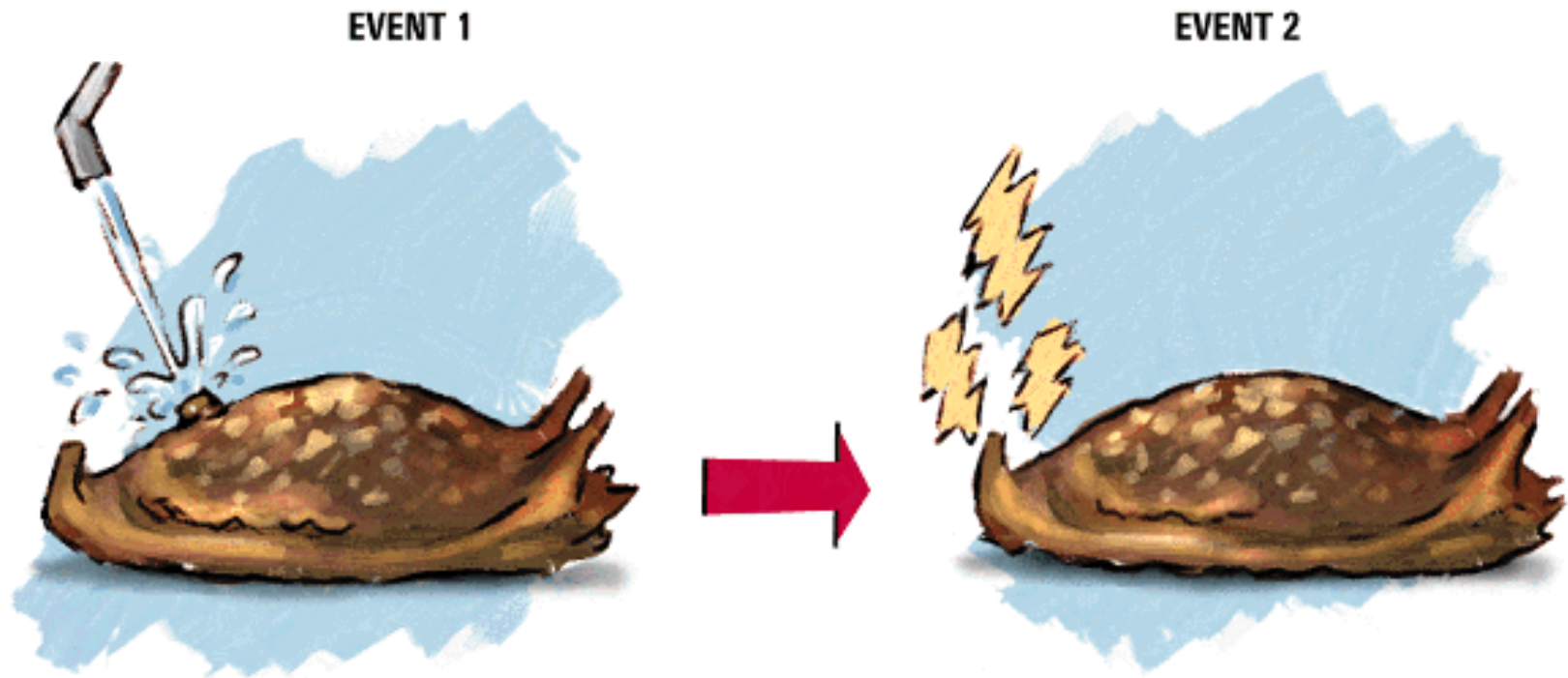
How Do We Learn?

We learn by association. Our minds naturally connect events that occur in sequence.

2000 years ago, Aristotle suggested this law of association. Then 200 years ago Locke and Hume reiterated this law.

Stimulus-Stimulus Learning

Learning to associate one stimulus with another.

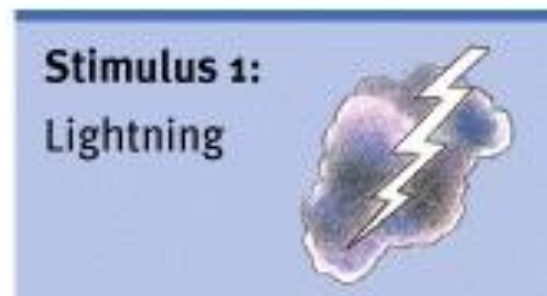


Sea snail associates splash with a tail shock

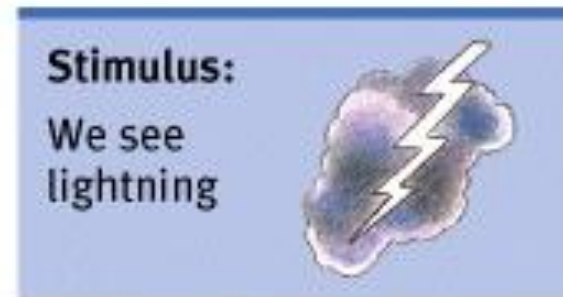
Stimulus-Stimulus Learning

Learning to associate one stimulus with another.

Two related events:



Result after repetition:



Response-Consequence Learning

Learning to associate a response with a consequence.



(a) Response: balancing a ball



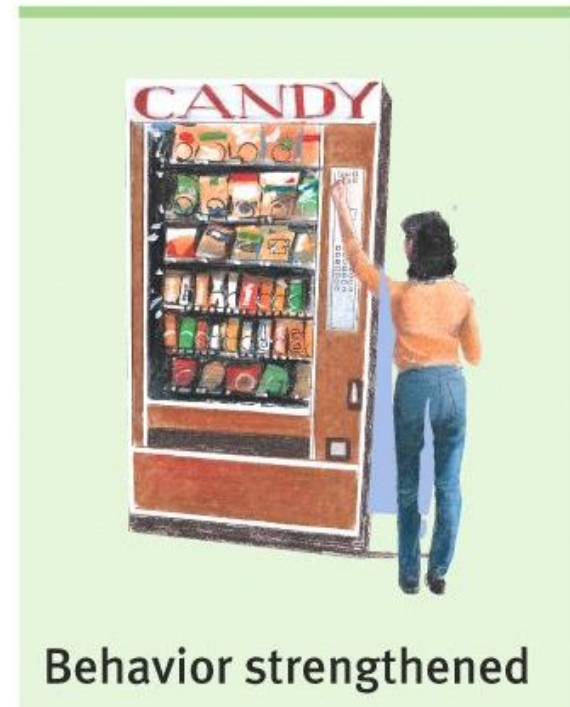
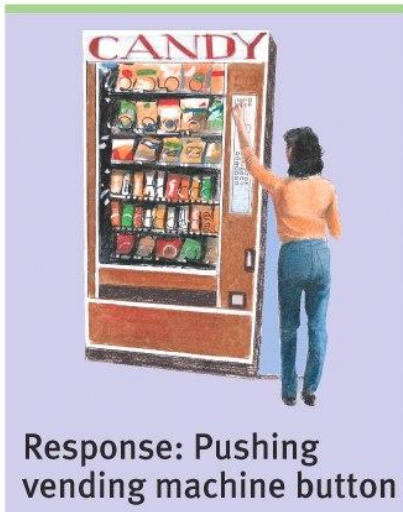
(b) Consequence: receiving food



(c) Behavior strengthened

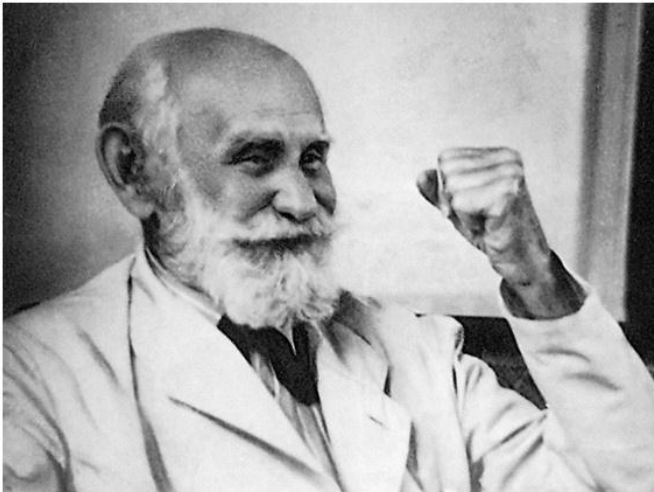
Response-Consequence Learning

Learning to associate a response with a consequence.



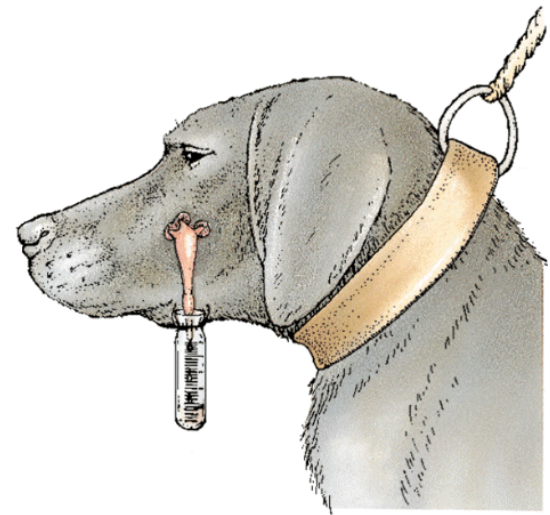
Classical Conditioning

Ideas of classical conditioning originate from old philosophical theories. However, it was the Russian physiologist **Ivan Pavlov** who elucidated classical conditioning. His work provided a basis for later behaviorists like **John Watson** and **B. F. Skinner**.



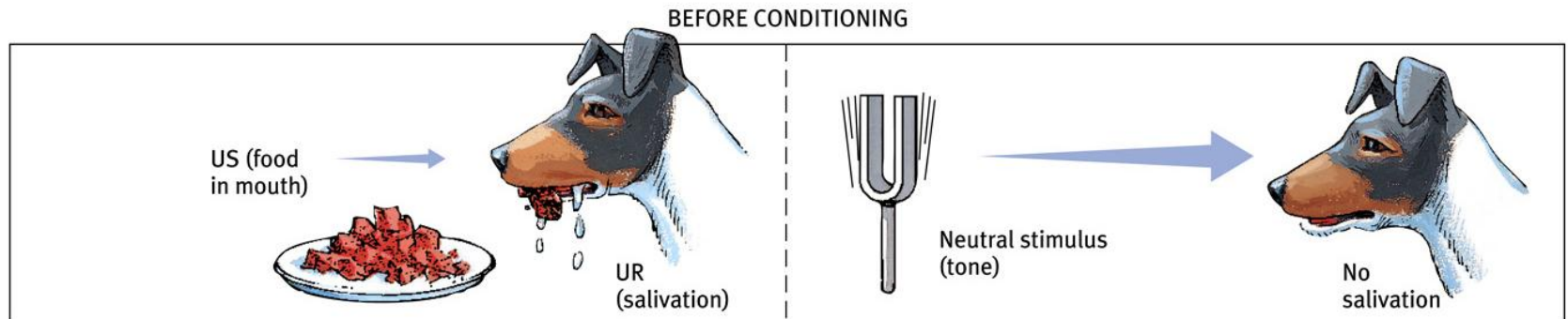
Sovfoto

Ivan Pavlov (1849-1936)



Pavlov's Experiments

Before conditioning, food (Unconditioned Stimulus, US) produces salivation (Unconditioned Response, UR). However, the tone (neutral stimulus) does not.

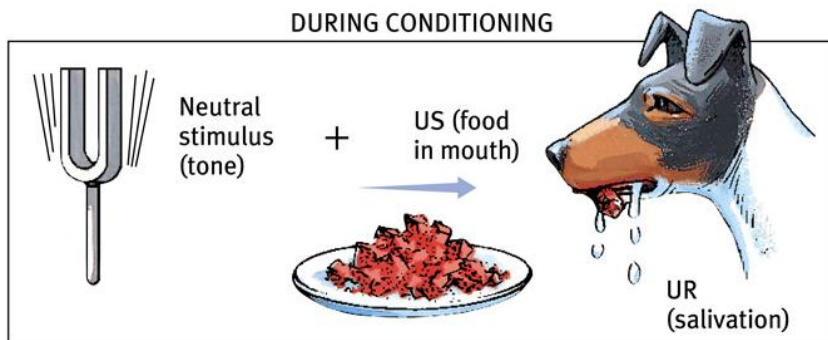


An unconditioned stimulus (US) produces an unconditioned response (UR).

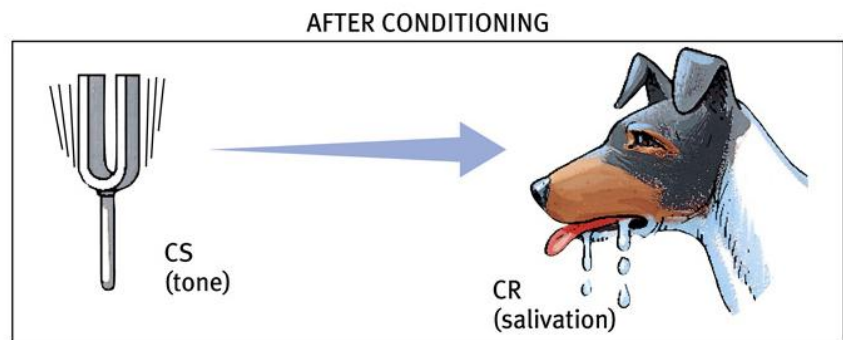
A neutral stimulus produces no salivation response.

Pavlov's Experiments

During conditioning, the neutral stimulus (tone) and the US (food) are paired, resulting in salivation (UR). After conditioning, the neutral stimulus (now Conditioned Stimulus, CS) elicits salivation (now Conditioned Response, CR)



The unconditioned stimulus is repeatedly presented just after the neutral stimulus. The unconditioned stimulus continues to produce an unconditioned response.



The neutral stimulus alone now produces a conditioned response (CR), thereby becoming a conditioned stimulus (CS).

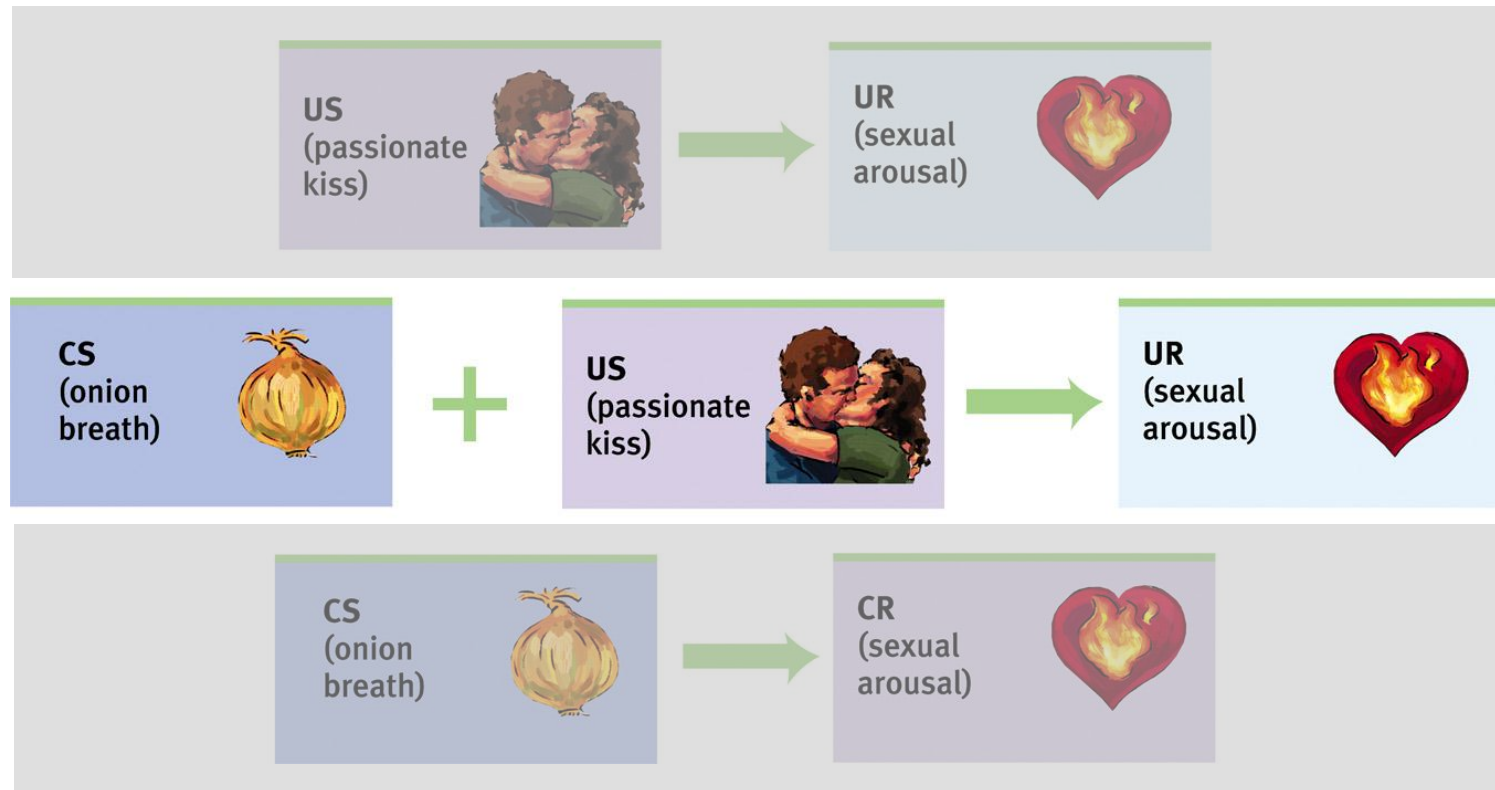
Acquisition

Acquisition is the initial stage in classical conditioning in which an association between a neutral stimulus and an unconditioned stimulus takes place.

1. In most cases, for conditioning to occur, the neutral stimulus needs to come before the unconditioned stimulus.
2. The time in between the two stimuli should be about half a second.

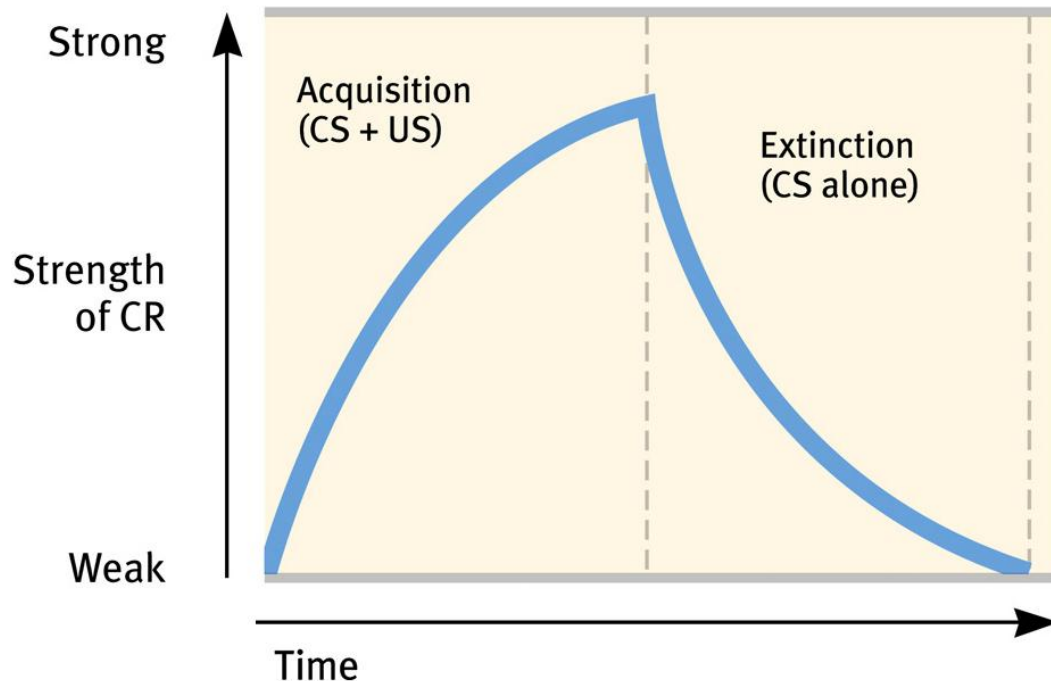
Acquisition

The CS needs to come *half a second before* the US for acquisition to occur.



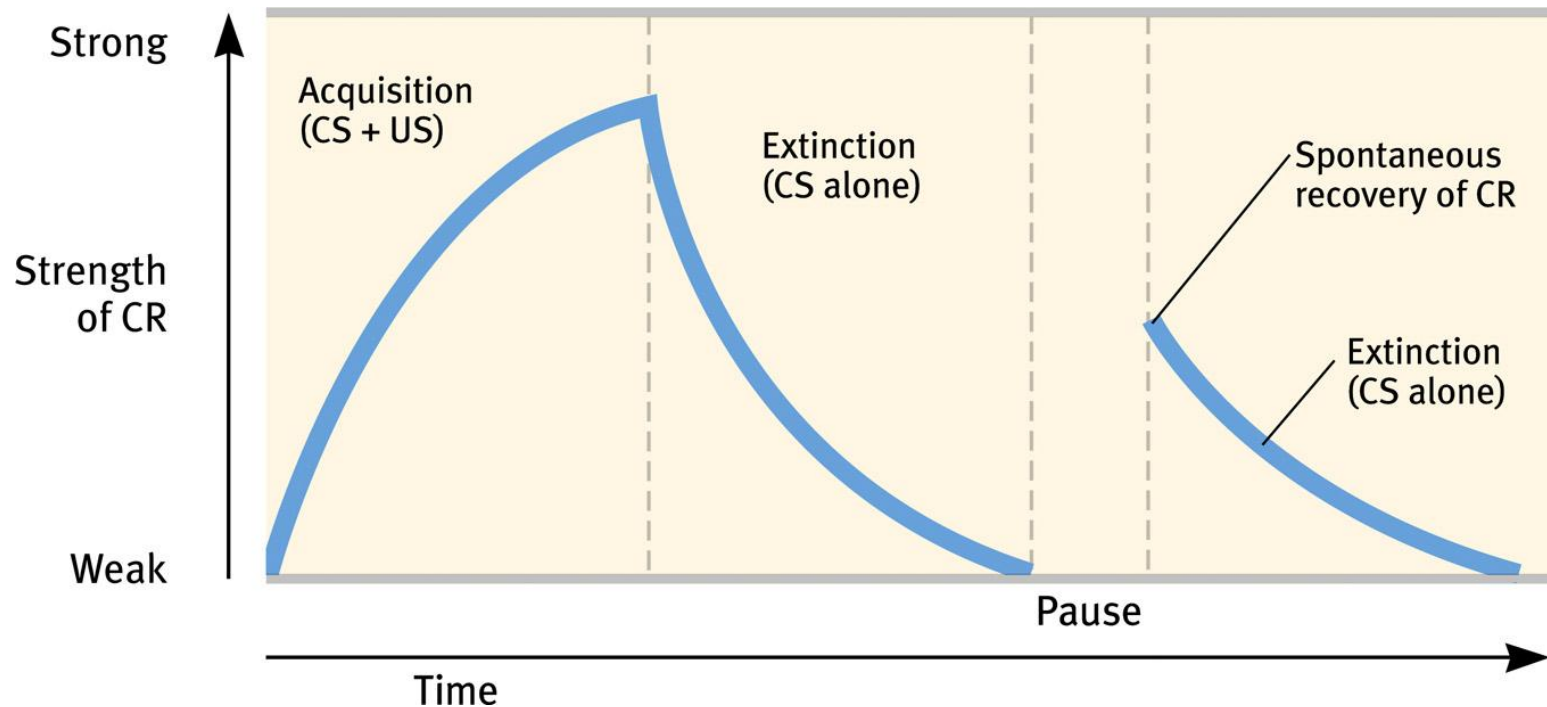
Extinction

When the US (food) does not follow the CS (tone), CR (salivation) begins to decrease and eventually causes extinction.



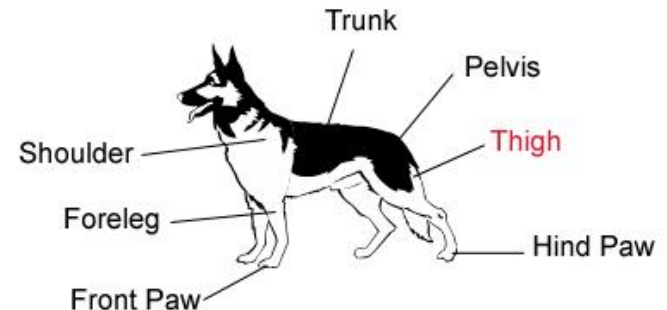
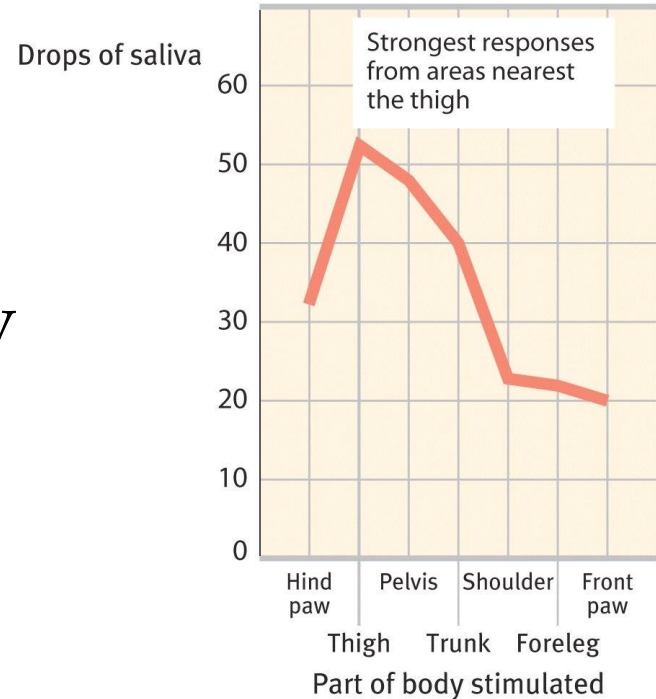
Spontaneous Recovery

After a rest period, an extinguished CR (salivation) spontaneously recovers, but if the CS (tone) persists alone, the CR becomes extinct again.



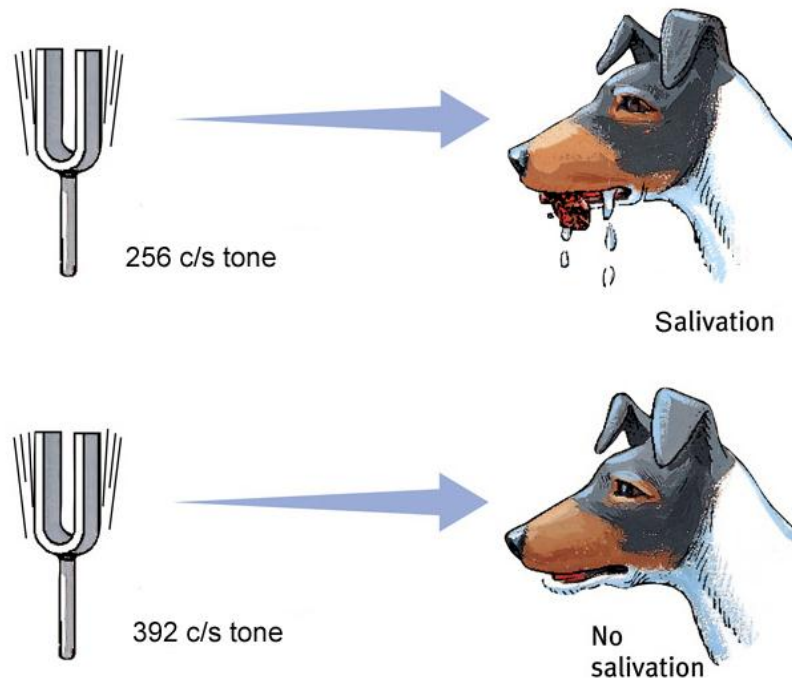
Stimulus Generalization

Tendency to respond to stimuli similar to the CS is called **generalization**. Pavlov conditioned the dog's salivation (CR) by using miniature vibrators (CS) on the thigh. When he subsequently stimulated other parts of the dog's body, salivation dropped.



Stimulus Discrimination

Discrimination is the learned ability to distinguish between a conditioned stimulus and other stimuli that do not signal an unconditioned stimulus.



Extending Pavlov's Understanding

Pavlov and Watson considered consciousness, or mind, unfit for the scientific study of psychology. However, they underestimated the importance of **cognitive processes** and **biological constraints**.

Cognitive Processes

Early behaviorists believed that learned behaviors of various animals could be reduced to mindless mechanisms.

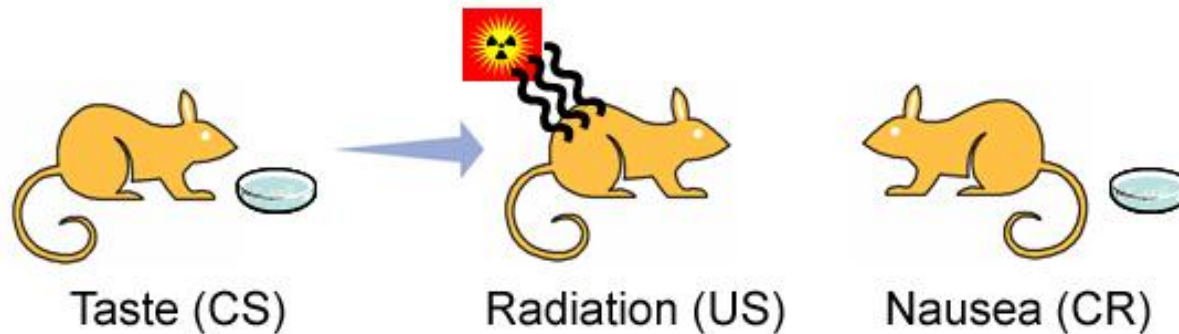
However, later behaviorists suggested that animals learn the predictability of a stimulus, meaning they learn *expectancy* or *awareness* of a stimulus (Rescorla, 1988).

Biological Predispositions

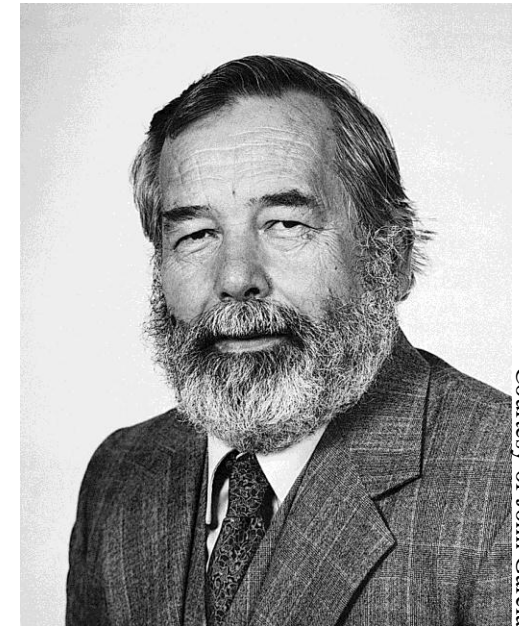
Pavlov and Watson believed that laws of learning were similar for all animals. Therefore, a pigeon and a person do not differ in their learning.

However, behaviorists later suggested that learning is constrained by an animal's biology.

Biological Predispositions



Garcia showed that the duration between the CS and the US may be long (hours), but yet result in conditioning. A biologically adaptive CS (taste) led to conditioning and not to others (light or sound).

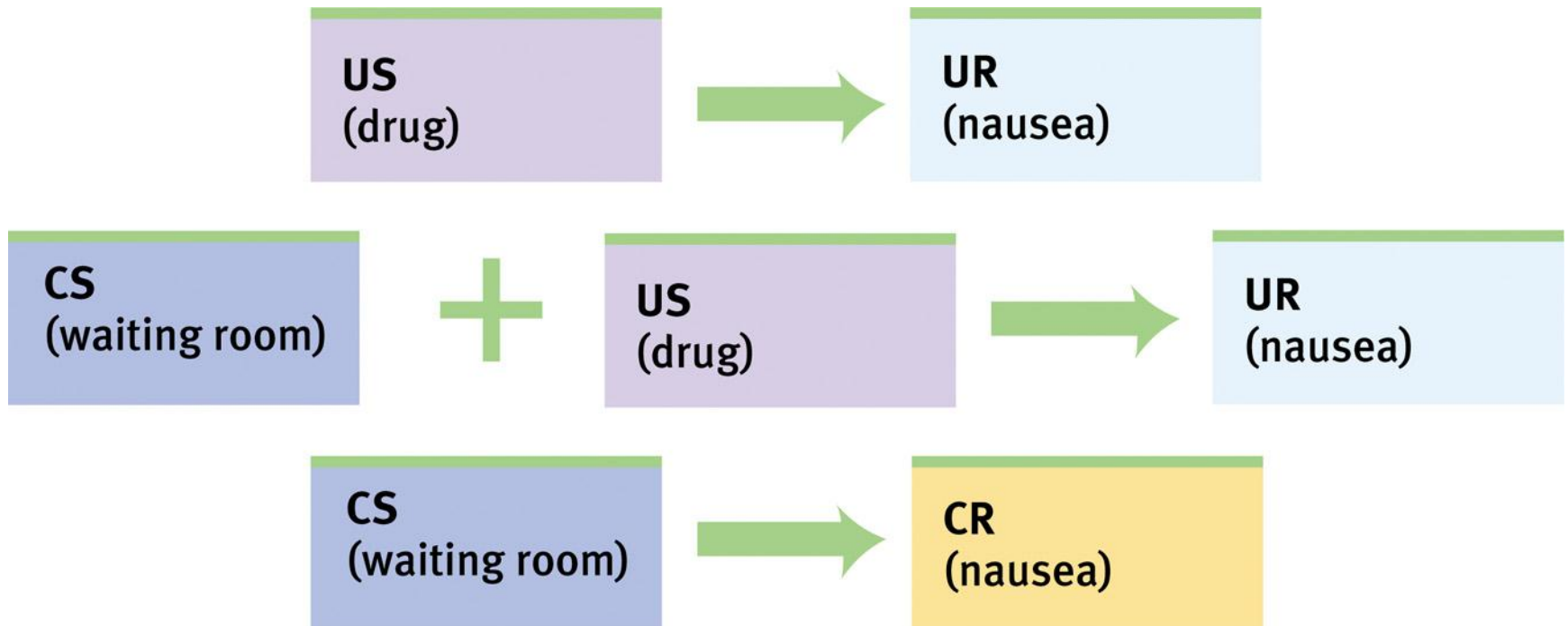


Courtesy of John Garcia

John Garcia

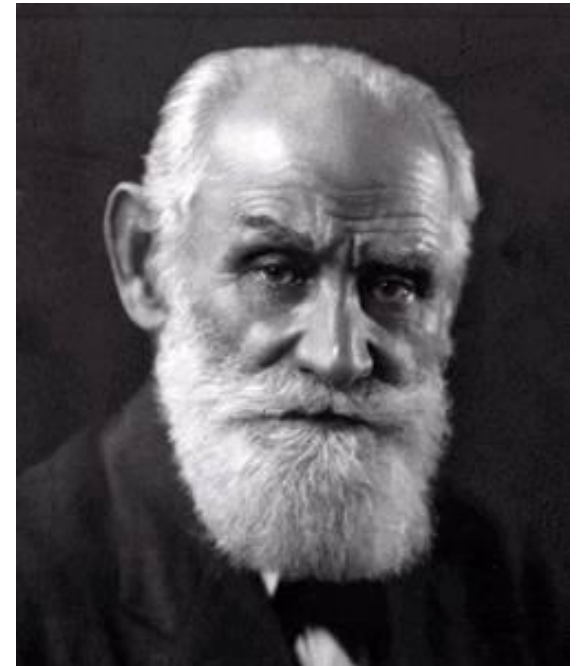
Biological Predispositions

Even humans can develop classically to conditioned nausea.



Pavlov's Legacy

Pavlov's greatest contribution to psychology is isolating elementary behaviors from more complex ones through objective scientific procedures.



Ivan Pavlov
(1849-1936)

Applications of Classical Conditioning

Watson used classical conditioning procedures to develop advertising campaigns for a number of organizations, including Maxwell House, making the “coffee break” an American custom.



Brown Brothers

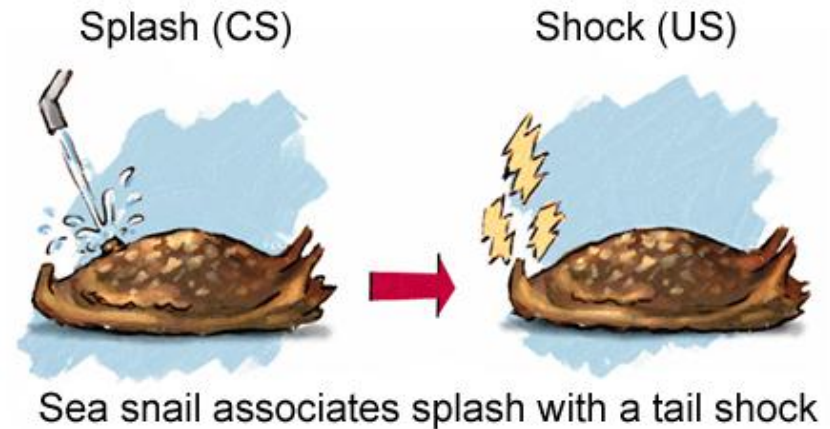
John B. Watson

Applications of Classical Conditioning

1. Alcoholics may be conditioned (aversively) by reversing their positive-associations with alcohol.
2. Through classical conditioning, a drug (plus its taste) that affects the immune response may cause the taste of the drug to invoke the immune response.

Operant & Classical Conditioning

1. Classical conditioning forms associations between stimuli (CS and US). Operant conditioning, on the other hand, forms an association between behaviors and the resulting events.

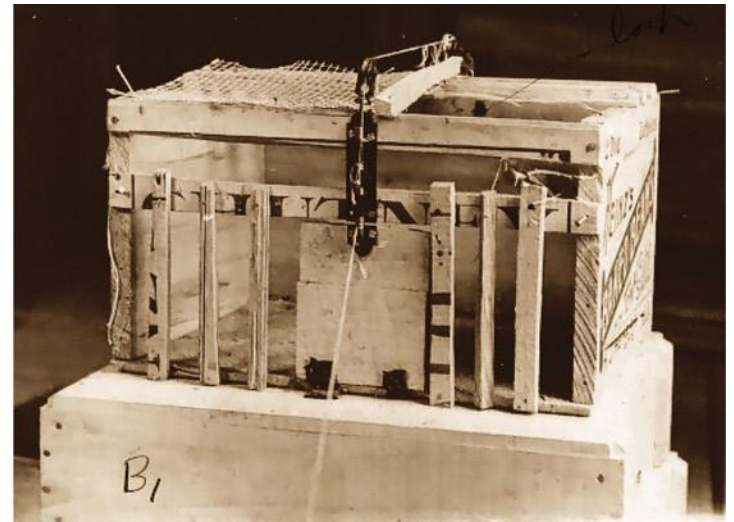
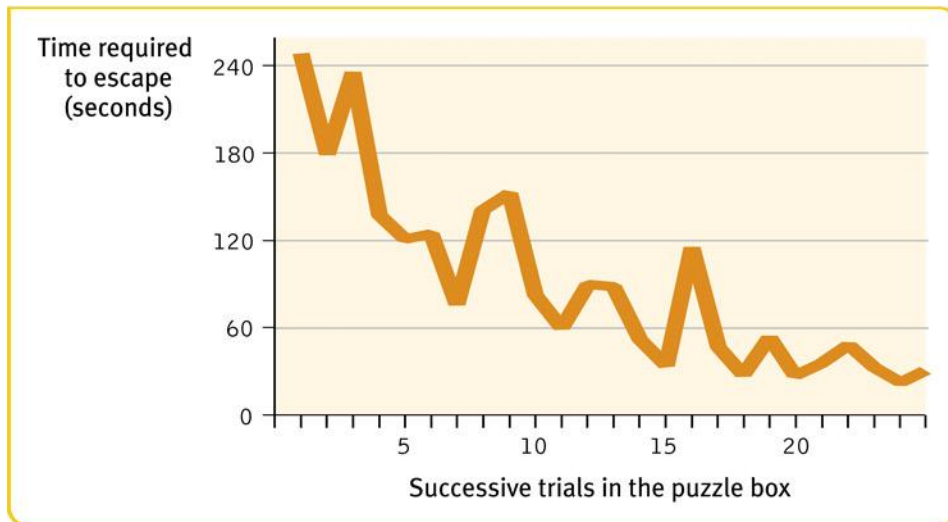


Operant & Classical Conditioning

2. Classical conditioning involves **respondent behavior** that occurs as an automatic response to a certain stimulus. Operant conditioning involves **operant behavior**, a behavior that operates on the environment, producing rewarding or punishing stimuli.

Skinner's Experiments

Skinner's experiments extend Thorndike's thinking, especially his **law of effect**. This law states that rewarded behavior is likely to occur again.

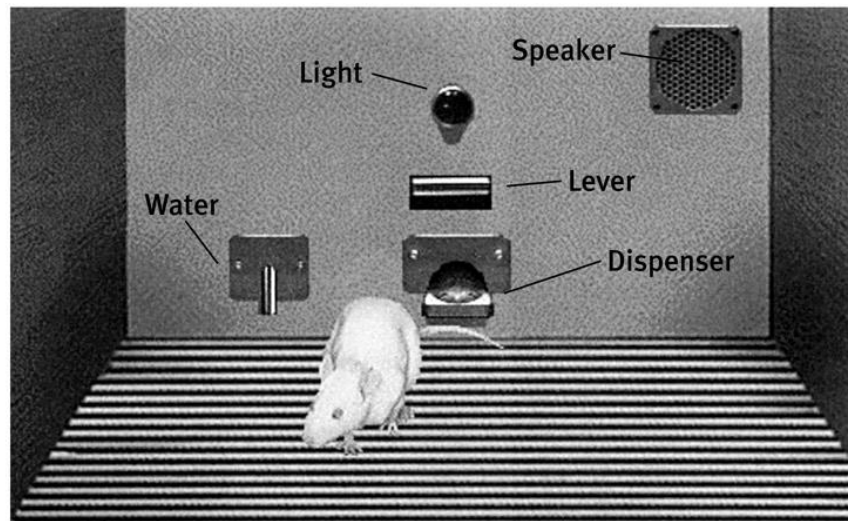


Operant Chamber

Using Thorndike's law of effect as a starting point, Skinner developed the Operant chamber, or the Skinner box, to study operant conditioning.



Walter Dawn/ Photo Researchers, Inc.



From *The Essentials of Conditioning and Learning*, 3rd Edition by Michael P. Domjan, 2005. Used with permission by Thomson Learning, Wadsworth Division

Operant Chamber

The **operant chamber**, or **Skinner box**, comes with a bar or key that an animal manipulates to obtain a reinforcer like food or water. The bar or key is connected to devices that record the animal's response.



Shaping

Shaping is the operant conditioning procedure in which reinforcers guide behavior towards the desired target behavior through successive approximations.



Khamis Ramadhan/ Panapress/ Getty Images



Fred Bavendam/ Peter Arnold, Inc.

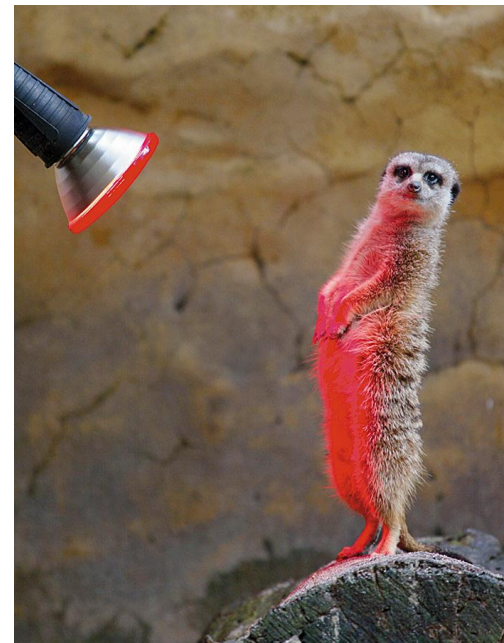
A rat shaped to sniff mines. A manatee shaped to discriminate objects of different shapes, colors and sizes.

Types of Reinforcers

Any event that strengthens the behavior it follows. A heat lamp positively reinforces a meerkat's behavior in the cold.

WAYS TO INCREASE BEHAVIOR

Operant Conditioning Term	Description	Possible Examples
Positive reinforcement	<i>Add a desirable stimulus</i>	Getting a hug; receiving a paycheck
Negative reinforcement	<i>Remove an aversive stimulus</i>	Fastening seatbelt to turn off beeping



Reuters/Corbis

Primary & Secondary Reinforcers

1. **Primary Reinforcer:** An innately reinforcing stimulus like food or drink.
2. **Conditioned Reinforcer:** A learned reinforcer that gets its reinforcing power through association with the primary reinforcer.

Immediate & Delayed Reinforcers

1. **Immediate Reinforcer:** A reinforcer that occurs instantly after a behavior. A rat gets a food pellet for a bar press.
2. **Delayed Reinforcer:** A reinforcer that is delayed in time for a certain behavior. A paycheck that comes at the end of a week.

We may be inclined to engage in small immediate reinforcers (watching TV) rather than large delayed reinforcers (getting an A in a course) which require consistent study.

Reinforcement Schedules

1. **Continuous Reinforcement:** Reinforces the desired response each time it occurs.
2. **Partial Reinforcement:** Reinforces a response only part of the time. Though this results in slower acquisition in the beginning, it shows greater resistance to extinction later on.

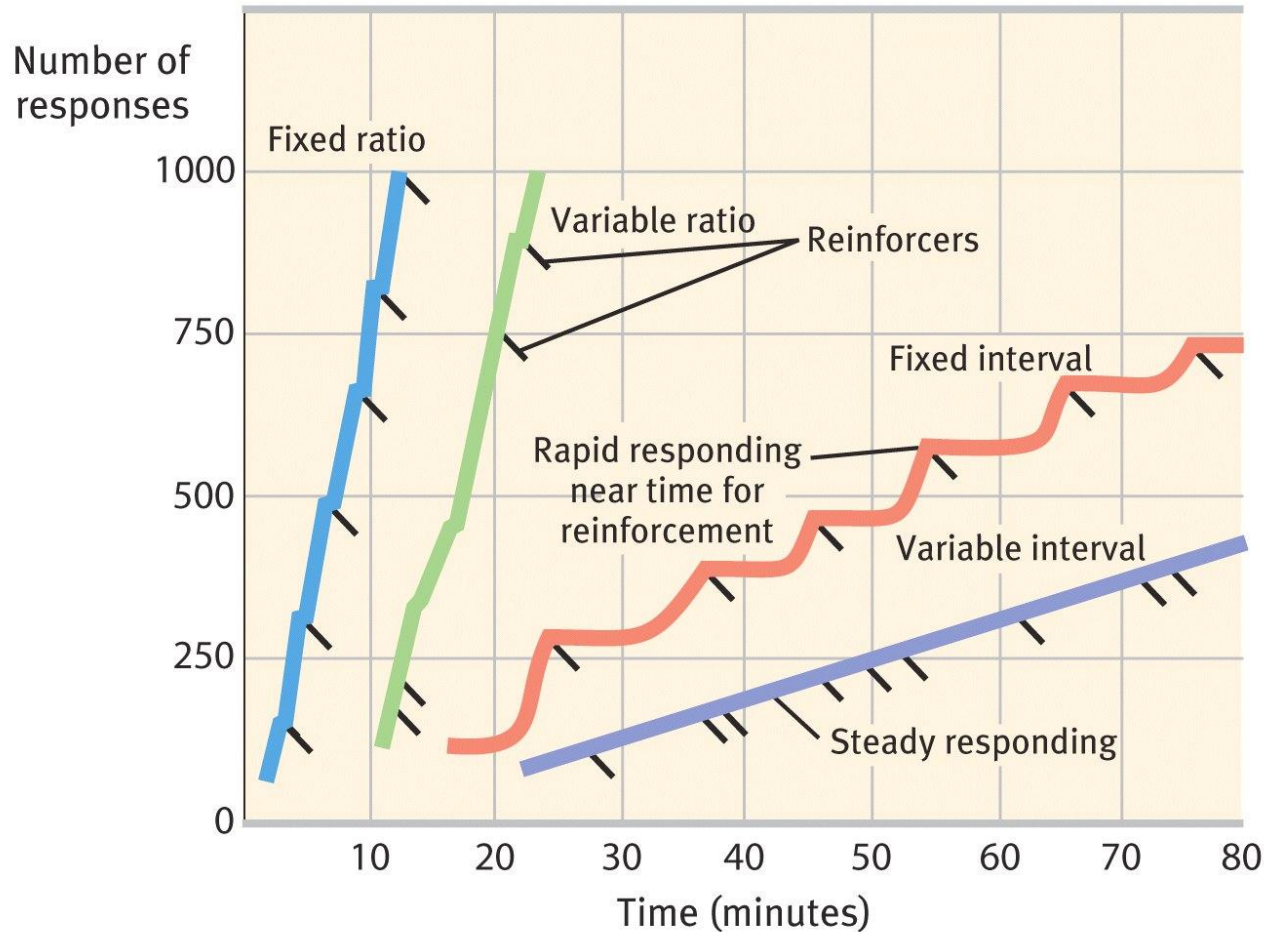
Ratio Schedules

1. **Fixed-ratio schedule:** Reinforces a response only after a specified number of responses. e.g., piecework pay.
2. **Variable-ratio schedule:** Reinforces a response after an unpredictable number of responses. This is hard to extinguish because of the unpredictability. (e.g., behaviors like gambling, fishing.)

Interval Schedules

1. **Fixed-interval schedule:** Reinforces a response only after a specified time has elapsed. (e.g., preparing for an exam only when the exam draws close.)
2. **Variable-interval schedule:** Reinforces a response at unpredictable time intervals, which produces slow, steady responses. (e.g., pop quiz.)

Schedules of Reinforcement



Punishment

An aversive event that decreases the behavior it follows.

WAYS TO DECREASE BEHAVIOR

Type of Punisher	Description	Possible Examples
Positive punishment	Administer an aversive stimulus	Spanking; a parking ticket
Negative punishment	Withdraw a desirable stimulus	Time-out from privileges (such as time with friends); revoked driver's license

Punishment

Although there may be some justification for occasional punishment (Larzelere & Baumrind, 2002), it usually leads to negative effects.

1. Results in unwanted fears.
2. Conveys no information to the organism.
3. Justifies pain to others.
4. Causes unwanted behaviors to reappear in its absence.
5. Causes aggression towards the agent.
6. Causes one unwanted behavior to appear in place of another.

Extending Skinner's Understanding

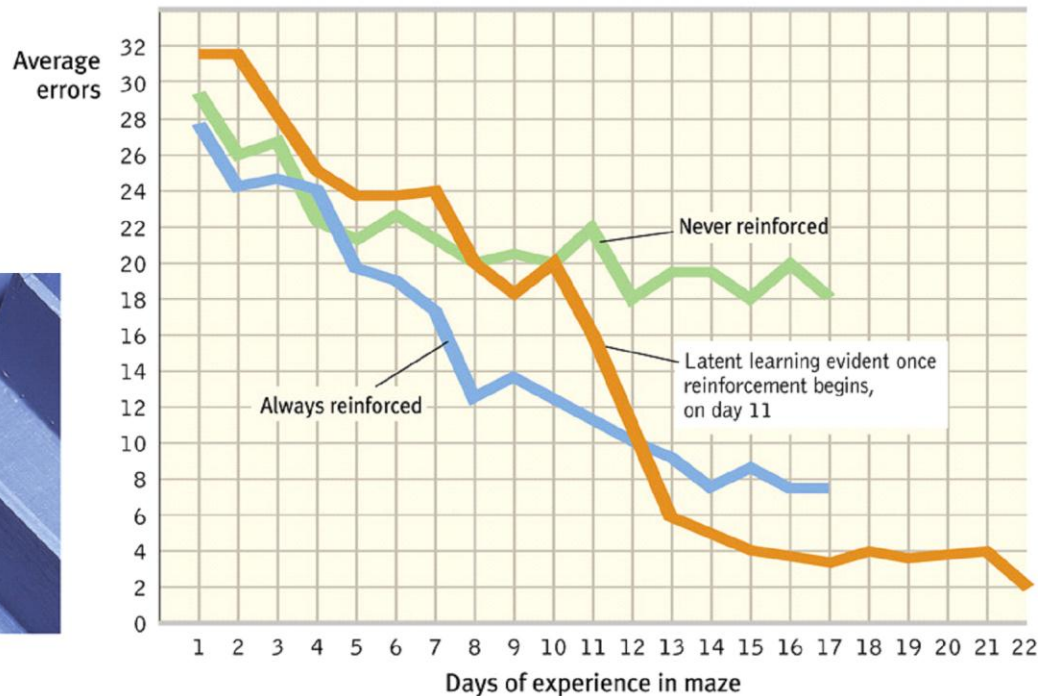
Skinner believed in inner thought processes and biological underpinnings, but many psychologists criticize him for discounting them.

Cognition & Operant Conditioning

Evidence of cognitive processes during operant learning comes from rats during a maze exploration in which they navigate the maze without an obvious reward. Rats seem to develop **cognitive maps**, or mental representations, of the layout of the maze (environment).

Latent Learning

Such cognitive maps are based on **latent learning**, which becomes apparent when an incentive is given (Tolman & Honzik, 1930).



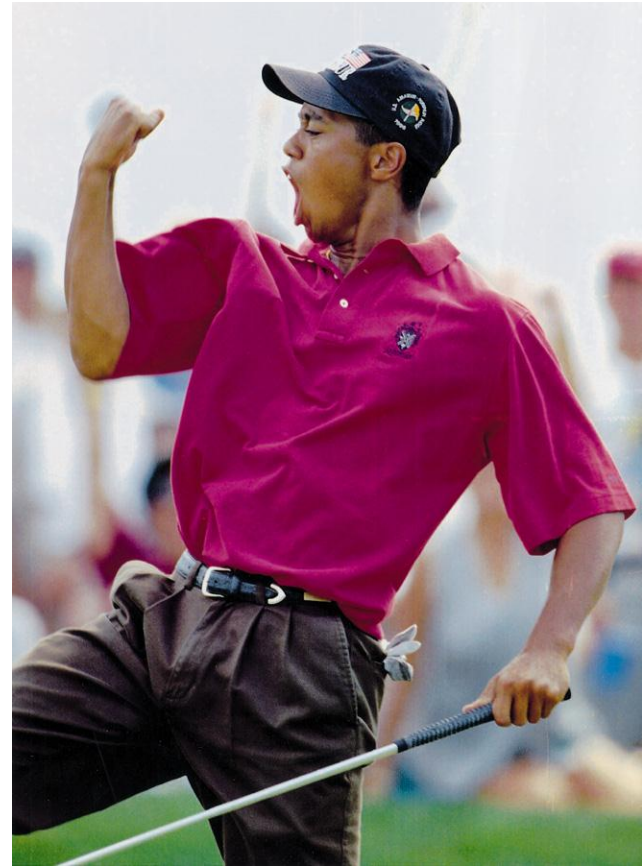
Motivation

Intrinsic Motivation:

The desire to perform a behavior for its own sake.

Extrinsic Motivation:

The desire to perform a behavior due to promised rewards or threats of punishments.



Biological Predisposition

Biological constraints predispose organisms to learn associations that are naturally adaptive.

Breland and Breland (1961) showed that animals drift towards their biologically predisposed instinctive behaviors.



Photo: Bob Bailey

Marian Breland Bailey

Skinner's Legacy

Skinner argued that behaviors were shaped by external influences instead of inner thoughts and feelings. Critics argued that Skinner dehumanized people by neglecting their free will.



Falk/ Photo Researchers, Inc. •

Applications of Operant Conditioning

Skinner introduced the concept of teaching machines that shape learning in small steps and provide reinforcements for correct rewards.



LWA-JDL/Corbis

In School

Applications of Operant Conditioning

Reinforcement principles can enhance athletic performance.



In Sports

Applications of Operant Conditioning

Reinforcers affect productivity. Many companies now allow employees to share profits and participate in company ownership.



At work

Applications of Operant Conditioning

In children, reinforcing good behavior increases the occurrence of these behaviors. Ignoring unwanted behavior decreases their occurrence.

Operant vs. Classical Conditioning

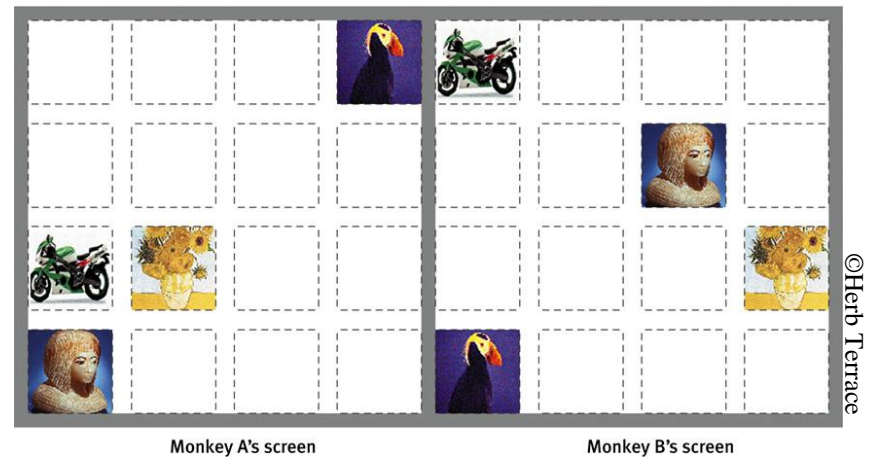
COMPARISON OF CLASSICAL AND OPERANT CONDITIONING

	Classical Conditioning	Operant Conditioning
Response	Involuntary, automatic.	Voluntary, operates on environment.
Acquisition	Associating events; CS announces US.	Associating response with a consequence (reinforcer or punisher).
Extinction	CR decreases when CS is repeatedly presented alone.	Responding decreases when reinforcement stops.
Cognitive processes	Organisms develop expectation that CS signals the arrival of US.	Organisms develop expectation that a response will be reinforced or punished; they also exhibit latent learning, without reinforcement.
Biological predispositions	Natural predispositions constrain what stimuli and responses can easily be associated.	Organisms best learn behaviors similar to their natural behaviors; unnatural behaviors instinctively drift back toward natural ones.

Learning by Observation

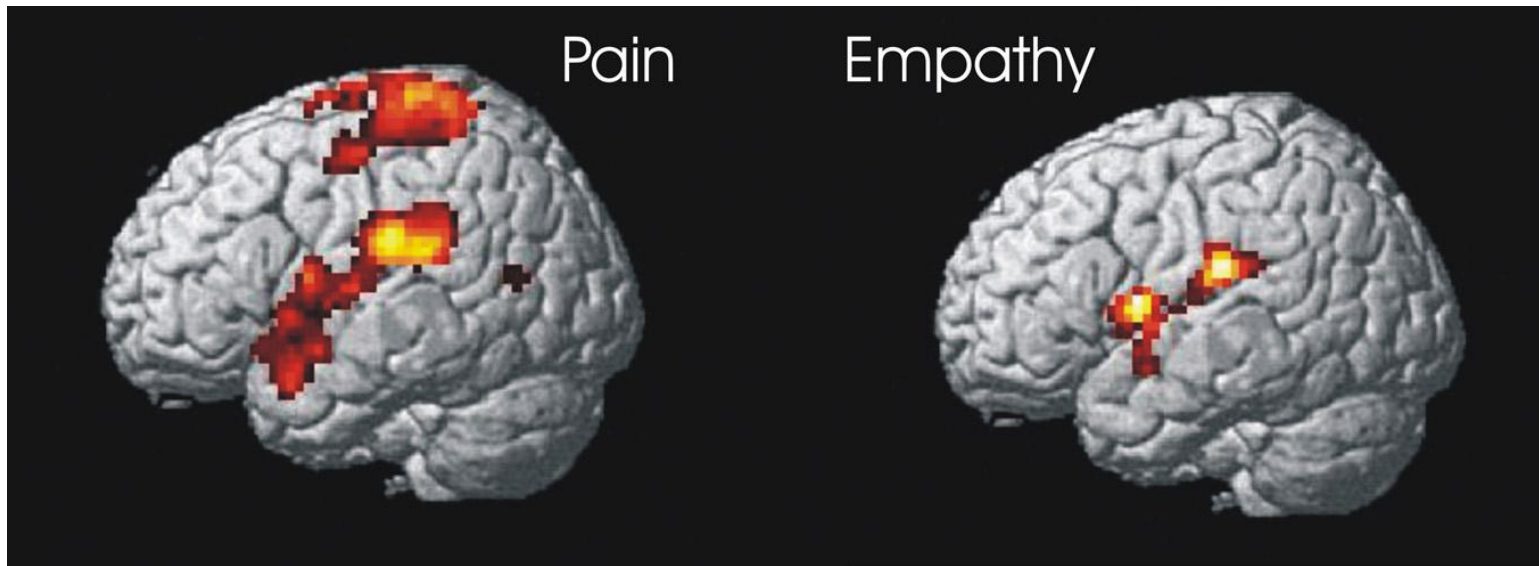
Higher animals, especially humans, learn through observing and imitating others.

The monkey on the right imitates the monkey on the left in touching the pictures in a certain order to obtain a reward.



Mirror Neurons

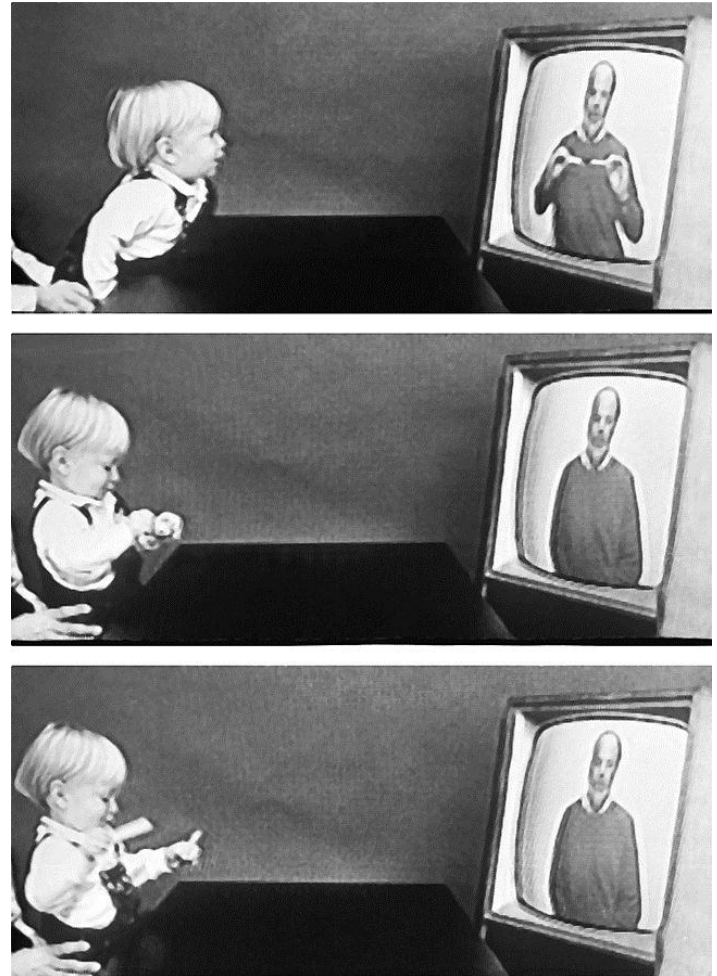
Neuroscientists discovered mirror neurons in the brains of animals and humans that are active during observational learning.



Reprinted with permission from the American Association for the Advancement of Science, Subiaul et al., Science 305: 407-410 (2004) © 2004 AAAS.

Imitation Onset

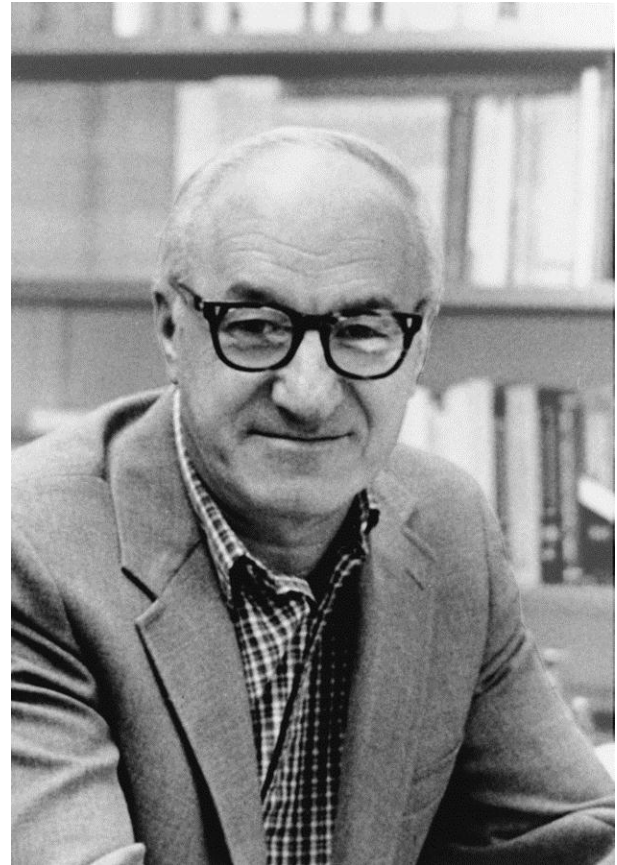
Learning by observation begins early in life. This 14-month-old child imitates the adult on TV in pulling a toy apart.



Meltzoff, A.N. (1998). Imitation of televised models by infants. *Child Development*, 59 1221-1229. Photos Courtesy of A.N. Meltzoff and M. Hanuk.

Bandura's Experiments

Bandura's Bobo doll study (1961) indicated that individuals (children) learn through imitating others who receive rewards and punishments.



Courtesy of Albert Bandura, Stanford University

Applications of Observational Learning

Unfortunately,
Bandura's studies
show that antisocial
models (family,
neighborhood or TV)
may have antisocial
effects.



Positive Observational Learning

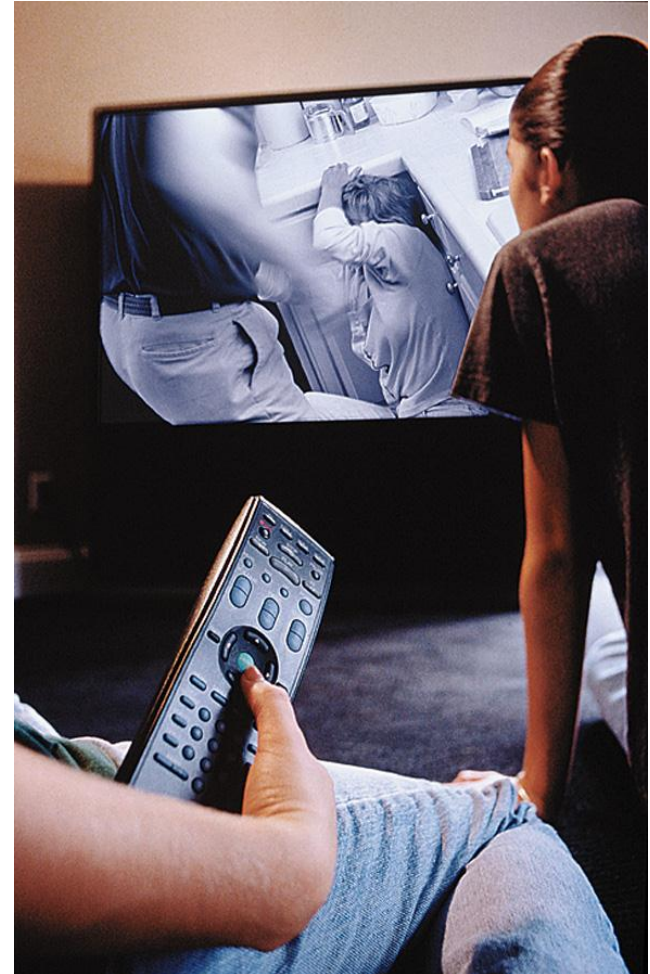
Fortunately, prosocial (positive, helpful) models may have prosocial effects.



Bob Daemrich/ The Image Works

Television and Observational Learning

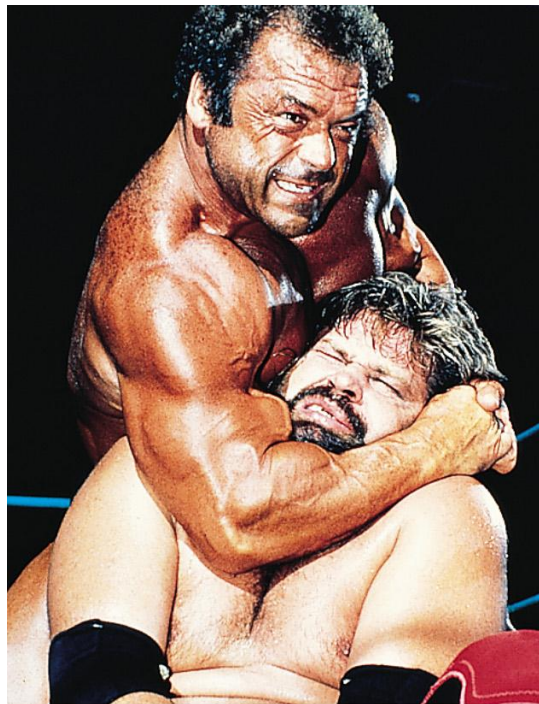
Gentile et al., (2004) shows that children in elementary school who are exposed to violent television, videos, and video games express increased aggression.



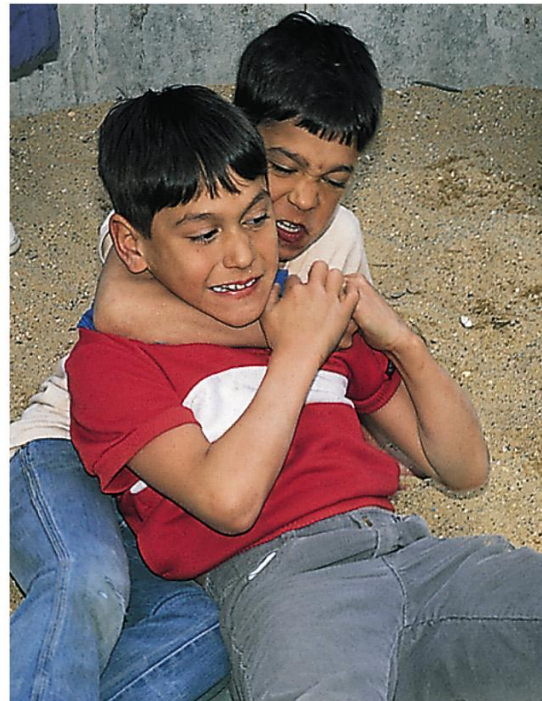
Ron Chapple/ Taxi/ Getty Images

Modeling Violence

Research shows that viewing media violence leads to an increased expression of aggression.



Bob Daemrich/ The Image Works



Glassman/ The Image Works

Children modeling after pro wrestlers